

IT-206 US

Description

Title of the invention: Housing for accepting a component
5 which can be connected to the housing in a pluggable manner.

The invention relates to a package for an electrical component
which can be connected to the package in a pluggable manner,
according to the precharacterizing clause of claim 1, and to a
10 method of mounting a package of this type on a printed-circuit
board.

It is known to arrange optoelectronic transceivers on a
printed-circuit board and connect them to an optical network
15 by means of optical plug-in connectors. Known in particular
are so-called small-form-factor-pluggable (SFP) transceivers
of a small type, which are of a pluggable design (so-called
"detachable transceivers") and can be plugged into a
receptacle of a package mounted onto the printed-circuit
20 board.

A corresponding metallic package 1 is represented in Figure 4.
The package comprises an upper part (top cage) 22 and a lower
part (bottom cage) 21, which can be connected to each other in
25 an engageable manner and form a receiving package into which a
transceiver can be plugged or from which a transceiver can be

unplugged in the direction of the double-headed arrow A-B. At the same time, the package 1 preferably serves as a shielding plate for the electromagnetic shielding of the pluggable transceiver.

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The lower part 21 of the package is fastened on a printed-circuit board 3. Both parts of the package 21, 22 protrude through a cutout in a metallic rear wall (not represented), which is electrically connected to the package via contact
10 springs 11. Also mounted within the package and directly on the printed-circuit board 3 is an electrical plug 4, by means of which the plugged-in transceiver can be connected to the printed-circuit board 3 and into which the transceiver is inserted during plugging into the package 1. As represented
15 in the detail in Figure 5, fastening pins 7 (also referred to as fastening legs or soldering pins) are formed on the underside of the lower part 21 of the package, are inserted into corresponding openings 31 in the printed-circuit board 3 and serve for the fastening of the package to the printed-
20 circuit board 3.

The package 1 is attached to the printed-circuit board 3 by, firstly, the lower part 21 of the package and the electrical plug 4 being inserted into the printed-circuit board 3 and by,
25 subsequently, the two being soldered. After the electrical plug 4 has been soldered, it is checked for defects and

reworked if necessary. Subsequently, the upper part 22 of the package is fitted onto the lower part 21 of the package.

The package known in the prior art has the disadvantage that,
5 on account of the mounting of the lower part at the same time as the electrical plug, relatively large openings have to be formed in the lower part of the package to allow subsequent testing of the electrical plug for defects to be ensured.

10 The present invention is based on the object of providing a package for a component which can be connected to the package in a pluggable manner and a method of mounting a package of this type on a printed-circuit board which make simple and inexpensive mounting possible with a simple design of the
15 package.

This object is achieved according to the invention by a package with the features of claim 1 and a method with the features of claim 7. Preferred and advantageous developments
20 of the invention are specified in the subclaims.

Accordingly, the package according to the invention is characterized in that the fastening pins which serve for the fastening of the package on the printed-circuit board can be
25 connected to the printed-circuit board, thereby forming a press-fit connection. In particular, the fastening pins clasp

in corresponding drill holes in the printed-circuit board. On account of the press-fit connection, a separate soldering operation is not necessary for connecting the fastening pins to the printed-circuit board. As a result, the mounting of the package on the printed-circuit board is simplified considerably.

A press-fit connection is understood here to mean any connection which establishes a connection between the pins and the printed-circuit board just by inserting the fastening pins into corresponding openings in the printed-circuit board, without any need for further mounting steps such as soldering or adhesive bonding. Press-fit connections may be both positive connections and non-positive connections. A press-fit connection is also referred to as a snug fit or press fit.

The use of a press-fit connection makes it possible to solder the electrical plug to the printed-circuit board even before the package is fastened to the printed-circuit board and subsequently test it for defects and carry out any necessary reworking. Since, at this stage, the package or the lower part of the package has not yet been mounted, the electrical plug is easily accessible. The package is only mounted after testing and any reworking of the plug have been carried out, with the result that there is no need to provide the package with openings for allowing such checking and reworking. It is

consequently possible for the package not to require corresponding openings or for them to be made smaller, so that the overall electromagnetic shielding effect is increased.

- 5 Correspondingly, the method according to the invention provides that, firstly, the plug for the optoelectronic component is soldered to the printed-circuit board and only after that is the package fitted onto the plug, the fastening pins of the package being inserted into drill holes in the
10 printed-circuit board, with a press-fit connection thereby being formed, and the fitted-on package receiving the plug. The package is, as it were, plugged into the printed-circuit board via the plug.
- 15 In a preferred development of the invention, the fastening pins have a serration which clasps in the corresponding drill holes in a printed-circuit board. In this case, the fastening pins are advantageously of a U-shaped design, the two legs of the fastening pin respectively having an external serration
20 and being able to move toward each other. The serration advantageously forms barbs which prevent the fastening pins inserted into the printed-circuit board from being able to be pulled out of the printed-circuit board again.

- 25 It is pointed out, however, that it is within the scope of the invention to realize any desired press-fit connections by

means of the fastening pins. Similarly, the fastening pins may, for example, be designed in a star-shaped form or as hooks. The only decisive criterion is that of satisfying the function of realizing a press-fit connection with the printed-
5 circuit board.

Apart from the mechanical fastening of a printed-circuit board, the fastening pins are also used for making electrical contact with a reference potential. For this purpose, the
10 drill holes in the printed-circuit board have an inner metallic coating which is connected to GROUND, with the result that the metallic fastening pins are likewise connected to this potential and tie the package to this potential.

15 In the preferred development of the invention, the package is of a one-part design. It has in this case a clearance on its bottom side in such a way that the package can be fitted onto the electrical plug which has already been connected to the printed-circuit board and couples the component to be inserted
20 to the printed-circuit board. The clearance may in this case cover the entire bottom, i.e. the package may be designed essentially without a bottom part.

A one-part package is distinguished by the fact that, in
25 comparison with a two-part package, it is mechanically more stable and can also be mounted automatically. In addition,

the electromagnetic shielding effect is improved, since there is no slit along the connecting line between an upper part of the package and a lower part of the package. Furthermore, there is no need for a mounting step to attach the upper part of the package on the lower part of the package, which in the case of the prior art represents a certain problem since it cannot be automated.

Once the electrical plug has been fastened on the printed-circuit board and tested, the package of a one-part design is fitted onto the printed-circuit board and connected to it by means of the press-fit serration of the fastening pins in one step, without further soldering operations or the attachment of an upper part of the package being required. In this way, extremely simple and effective mounting of the package is made possible.

The invention is explained in more detail below on the basis of an exemplary embodiment with reference to the figures of the drawing, in which:

Fig. 1 shows a perspective view of a one-part package according to the invention obliquely from above;

Fig. 2 shows a perspective view of the package of Figure 1 obliquely from below;

Fig. 3 shows a view of a detail of the fastening pins of Figures 1, 2, provided with a serration;

5 Fig. 4 shows a package according to the prior art and

Fig. 5 shows fastening pins according to the prior art.

A package for receiving an optoelectronic transceiver and its
10 fastening on a printed-circuit board were explained at the beginning on the basis of Figures 4 and 5.

According to Figures 1 and 2, the package 1 is of a one-part design and has two side walls 11, 12, an upper wall 13, a rear
15 wall 14 and a bottom region 15. The bottom region 15 of the package is formed essentially free of material, with the result that the package 1 is U-shaped in cross section. Only in the receiving region for the transceiver is a peripheral shielding plate 16 formed. Alternatively, according to Figure
20 4, a clearance is provided in the bottom region. At least such a clearance is required, however, to allow an electrical plug to be fastened on the printed-circuit board in a way corresponding to the plug 4 of Figure 4.

25 An electrooptical transceiver (not represented) can be inserted into the package 1 via the front, open region 17 of

the package. The transceiver has an electrooptical component such as a laser diode and/or a receiving diode, the associated electrical driver circuits or postamplification circuits and, at its rearward region in the plugging direction, a plug receptacle for the coupling on of an optical plug.

Transceivers of this type are known per se in the prior art, so are not dealt with any further.

Formed on the underside of the side walls 11, 12 of the one-part package 1 are fastening pins 8, which are represented in the detail in Figure 3. The fastening pins 8 are connected to the printed-circuit board, thereby forming a press-fit connection. Any desired press-fit connections can be used here for connecting the package to the printed-circuit board 3.

In the embodiment of Figure 3, the fastening pins 8 have a special configuration to the extent that they are of a U-shaped design, the middle cross-piece 81 being integrally formed onto the lower edge of the package. The two side legs 82, 83 are spaced apart from each other, so that when the fastening pin 8 is inserted into the drill hole in a printed-circuit board they are pressed together and thereby produce a radial spring force in the outward direction.

The two legs 82, 83 have in each case an external serration 82a, 83a, which is made in the form of barbs. When the fastening pin 8 is inserted into a drill hole in the printed-circuit board, the two legs 82, 83 are pressed resiliently together and the serration 82a, 83a wedges itself in the corresponding drill holes on account of the barbs and the spring force of the pressed-together legs 82, 83. A press-fit connection is provided in this way.

10 The fastening of the package 1 on a printed-circuit board 3 then takes place by the electrical plug 4 (cf. Figure 4) firstly being soldered on the printed-circuit board and subsequently tested and reworked. After completion of the soldering operation and testing of the plug, the one-part
15 package 1 is fitted onto the printed-circuit board in a single mounting process, the fastening pins of the package engaging into corresponding drill holes 31 in the printed-circuit board 3, with a press fit or a press-fit connection thereby being formed (cf. Figure 4). The package fitted onto the printed-
20 circuit board 3 receives the premounted plug 4 or other components premounted on the printed-circuit board.

The fastening pins 8 are additionally used for connecting the package 1 to GROUND. For this purpose, the drill holes in the
25 printed-circuit board 3 for receiving the fastening pins 8 are coated in a conducting manner, for example platinum-plated, on

their inner side and this coating in the printed-circuit board is connected to GROUND. The metallic pins 8 are consequently also used to tie the package 1 to GROUND. The package is preferably also connected to GROUND via contact springs in the
5 region of the peripheral shielding plate 16 (cf. Figure 4), which bear against a metallic rear wall.

The one-part design of the package 1 provides good shielding from interfering radiation produced inside the package.

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The invention is not restricted in its execution to the exemplary embodiments represented above. For example, it is likewise within the scope of the invention to connect the lower part of a two-part package according to Figure 4 to a
15 printed-circuit board via a press-fit connection. All that is essential for the invention is that the fastening pins of a package for receiving an electrical component are able to be connected to a printed-circuit board via a press-fit connection.